MBJ-003-1012004 Seat No. _____

B. Sc. (Sem. II) (CBCS) Examination

March / April - 2018

Chemistry : C-201

[New Course]

**Faculty Code : 003**

Subject Code : 1012004

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (i)   There are five questions.

(ii) In each question subquestion (a) of 4 marks, all are compulsory.

(iii) While subquestion (b), (c), (d) each with internal options.

(iv) Figures to the right indicate full marks.

1   (a)   Answer the following questions :   **4**

(1)   Define : Lattice energy.

(2)   What is Ligand ?

(3)   Draw the structure of $\left[Ni\left(CN\right)_4 \right]^{-2}$.

(4)   What will be the geometry of ionic crystal if the limiting radius ratio is 0.225 ?

(b)   Answer any one in brief of following :   **2**

(1)   Explain P-type extrinsic semiconductors.

(2)   Explain Ionisation Isomerism with example.

(c)   Answer any one in detail of following :   **3**

(1)   Derive the value of r^+/r^- for Trigonal crystal structure.

(2)   Explain co-ordination position isomerism with example.

(d) Answer any one of following : **5**
  (1) Explain Born-Haber cycle with example.
  (2) Discuss Geometrical isomerism in 4-co-ordinate complex compounds.

2 (a) Answer the following questions : **4**

  (1) Give the order of ionic radius of Cr^{+2}, Cr^{+3} and Cr^{+4}.

  (2) Give the electronic configuration of Cr and Cu.
  (3) Give the full form of FCCL.
  (4) The total number of atoms in a body centered cubic unit cell is _____.

(b) Answer any one in brief of following : **2**
  (1) Give the name, symbol and atomic number of first transition series elements.
  (2) Discuss Bravais lattice.

(c) Answer any one in detail of following : **3**
  (1) Write magnetic properties of first transition series element.
  (2) Explain law of rational indices.

(d) Answer any one of following : **5**
  (1) Discuss about the oxidation states and their stability in 3d-elements.
  (2) Discuss the internal structure of NaCl (Rock-Salt) by X-ray diffraction data.

3 (a) Answer the following questions : **4**
  (1) Give the structural formula of Bicyclo [4,3,0] nonane.
 (2) Give IUPAC name of following structure :
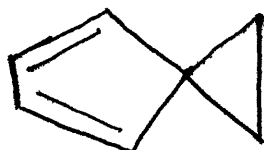
  (3) Which conformer is most stable for ethane ?
  (4) Define : Conformational Analysis.

(b) Answer any one in brief of following :   2
   (1) Write Wurtz's reaction for preparation of cyclopropane.
   (2) Give IUPAC name of

   (a)

   (b)
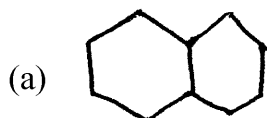
(c) Answer any one in detail of following :   3
   (1) Explain Diels-Alder reaction.
   (2) Give any two Addition reaction of cycloalkane.

(d) Answer any one of following :   5
   (1) Write short note on Baeyer's strain theory.
   (2) Explain conformational analysis of n-butane.

4 (a) Answer the following questions :   4
   (1) Complete the reaction

   $$\text{Nitrobenzene} \xrightarrow[H_2SO_4]{HNO_3 \, , \, 100^o \, C}$$
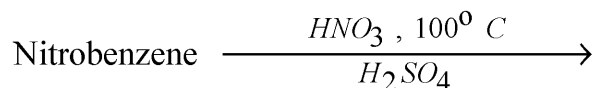
   (2) What are aromatic ions ?
   (3) Give structural formula of cyclopropenyl cation.
   (4) Give structural formula of cumene.

(b) Answer any one in brief of following :   2
   (1) Give the criteria for aromaticity.
   (2) Naphthalene is aromatic but [10] Annulene is not
       aromatic, explain.

(c) Answer any one in detail of following :   3
   (1) Halogenation of benzene.
   (2) Explain application of Huckel's rule to cyclopentadinyl
       ions.

(d) Answer any one of following :   5
   (1) Explain Friedel Craft acylation reaction with
       mechanism.
   (2) Explain electrophilic aromatic substitution reaction of
       benzene with mechanism.

5 (a) Answer the following questions : **4**

    (1) Normality of 1M H_2SO_4 is _____.

    (2) The value of K_w at 25°C is _____.

    (3) Define : pH of solution.

    (4) KCl is example for salt of _____ acid and _____ base.

  (b) Answer any one in brief of following : **2**

    (1) Explain degree of hydrolysis.

    (2) Calculate the pH of 0.001M HCl.

  (c) Answer any one in detail of following : **3**

    (1) Explain mechanism of acidic and basic buffer solution.

    (2) Calculate the Kh_iX and pH of 0.01M aqueous solution of C_6H_5COONa at 25°C.
    $(K_a=1.8\times10^{-6}; \ K_w=1.0\times10^{-14})$

  (d) Answer any one of following : **5**

    (1) Derive the equation of pH for the solution of salt with strong acid and weak base.

    (2) Find out the pH of a buffer solution containing 0.2 mole per litre CH_3COONa and 0.15 mole per litre CH_3COOH.
    $(K_a=1.8\times10^{-5}$ for $CH_3COOH)$

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